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DOMINANCE OF CHARACTERISTICS IN POULTRY

BY

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DOMINANCE OF CHARACTERISTICS IN POULTRY.

By Professor Davenport, Station for Experimental Evolution,
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According to Mendel's first principle, when two opposed characteristics (allelomorphs, Bateson) meet in hybridisation, one only appears in the offspring; this character is called dominant, while the occluded characteristic is called recessive. The question is: What determines which of the two characteristics shall dominate? Is there any general law of dominance?

Three hypotheses have been formulated. First, it has been suggested by de Vries and others that the allelomorph belonging to the older species dominates. But this cannot be a general law, for it implies that all of the characteristics of the one species shall dominate over all those of the other species, and this is certainly not usually true. Second, Correns has concluded that, in general, the phylogenetically more advanced characteristic—the later originated, younger characteristic—dominates. Third, there is an hypothesis proposed by de Vries, and based upon his dictum that a variety differs from the parent species in that at least one characteristic of the species has become latent in the variety. Then, when an individual having a certain characteristic patent is crossed with one in which that characteristic is latent, the patent characteristic is dominant; the latent, recessive.

The two latter hypotheses have been tested on poultry, a group that shows a great number of allelomorphs. To test the Correns hypothesis the older and newer allelomorphs are placed opposite each other in parallel columns and the dominant characteristics are italicised.

Old Characteristics	New Characteristics
1. Single comb.	*Pea comb.*
2. Single comb.	*Rose comb.*
3. *Low nostril.*	High nostril.
4. *Plain skull.*	Cerebral hernia.
5. Plain head.	*Crest.*
6. No muffling.	*Muffling.*
7. Plain feathers.	*Frizzled* feathers.
8. *Non-silkiness.*	Silkiness.
9. White skin.	*Black skin.*
10. Red iris.	*Black iris.*
11. Black plumage.	*White plumage.*
12. Red plumage.	*Black; no red.*
13. *Shafting*	No shafting.
14. *Pencilling.*	No pencilling.

This table shows that, out of fourteen characteristics, five old ones are dominant and nine new ones. Clearly, dominance in poultry is not determined by the age of the characteristic.

The second table is arranged to test de Vries's hypothesis of dominance of patent over latent characteristics. As not all of the preceding characters can be placed in these two categories, this list differs from the last.

Characteristic	Patent Condition	Latent Condition
1. Nasal process of premaxillary	*Narrow nostril*	High nostril
2. Cerebral closure	*Plain skull*	Cerebral hernia
3. Crest	*Present*	Absent
4. Complete development of feather	*Non-silkiness*	Silkiness
5. Plumage pigment	Black and red	*White* (usually)
6. Shafting	*Present*	Absent
7. Pencilling	*Present*	Absent

This table shows that of the foregoing seven characters six are dominant in the patent condition. The exceptional case of white pigment is not universally dominant. The result indicates that de Vries's law is a valid one where the allelomorphs can be classified as patent and latent respectively. The law has, however, this plain limit to its applicability.

A more general expression of the law of dominance in poultry is this: a progressive variation, one which means a further stage in ontogeny (whether novel or ancient, and without reference to latency or patency), will be dominant; a variation that is due to abbreviation of the ontogenic process, which depends on something having dropped out, will be recessive. The following table shows this relation:

Characteristic	Progressive Condition	Arrested Condition
1. } Comb	*Pea*	Single
2. } Comb	*Rose*	Single
3. Nasal process of premaxillary	Developed; *narrow nostril*	Undeveloped; wide nostril
4. Cerebral closure	Perfect; *plain skull*	Imperfect; hernia
5. Crest	*Present*	Absent
6. } Feather-form	Typical; *plain*	Embryonic; silky
7. } Feather-form	*Frizzled*	Plain
8. Muffling	*Present*	Absent
9. Skin colour	Pigmented; *black*	White
10. Iris colour	Pigmented; *black*	Red
11. Plumage colour	Pigmented	*White* (usually)
12. Melanic pigmentation	Melanism; *wholly black*	Red and black pigmented
13. Shafting	*Present*	Absent
14. Pencilling	*Present*	Absent

Of the foregoing fourteen characters thirteen have the more progressive condition of the characteristic dominant. The exception is again plumage colour, which is, as stated, not always an exception.

To sum up, I think the evidence warrants the conclusion that, in poultry, dominance of a characteristic in hybridisation is usually determined by the same causes as determine the appearance in the race of a progressive variation.

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